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ABSTRACT

Within the context of the role of rural employment in overall economic development, the objectives were to summarize existing knowledge of the rural African nonfarm sector and to develop an analytical framework for examing utilization of labor in this sector, using a descriptive profile, a theoretical model, and a research approach to rural nonfarm employment in Sierra Leone. Empirical evidence assembled for the profile revealed that the rural nonfarm sector was an important source of income and employment in Africa. The most important occupational groups in this sector were "sales workers" and "craftsmen and production process workers" (70 percent). Modifications of the Hymer-Resnick model included relaxing the assumption that output of the rural nonfarm sector cannot be traded to urban areas and abroad, and considering the effects of the backward and forward linkages of agriculture on growth of this sector. Providing the framework for proposed research in Sierra Leone and other African countries, the modified model included the following components: an estimate of total population of rur l and nonfarm establishments; a description of these establishment (type of activity and workshop, number of workers and machines, quantity of output and input, and capital assets); characteristics of the entrepeneur; and farm household activities, income, and expenditures. (JC)

AFRICAN RURAL EMPLOYMENT STUDY

African Rural Employment Paper No. 5

RESEARCH ON EMPLOYMENT IN THE RURAL NONFARM SECTOR IN AFRICA

by

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RC006252

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April, 1973

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THE AFRICAN RURAL EMPLOYMENT STUDY

The African Rural Employment Study was initiated in 1971 by a network of scholars in order to further comparative analysis of the development process in selected African countries with emphasis on rural employment problems. The research program is jointly designed by scholars in African countries, Michigan State University, other universities in North America and Europe who desire to pursue research on employment problems in selected African nations. Research emphasis is being directed to Sierra Leone, Nigeria and Ethiopia. In addition, individual scholars in other countries, such as Ghana, Zaire, Tanzania and Kenya are carrying out research on rural employment problems and are members of the network.

The research program emphasizes joint and individual studies of rural employment such as the demand for labor in alternative production systems and in the rural nonfarm sector, the migration process as a link between rural and urban labor markets and the impact of macro policies on labor absorption in agriculture. Attention will be directed to developing policy models to trace the consequences of alternative strategies of agricultural development on farm output, employment, income distribution and migration and to incorporating the employment objective into project, sub-sector and sectoral analysis in developing countries.

The study maintains close links with similar networks of scholars in Latin America (ECIEL) and Asia (CAMS) and with organizations such as the FAO, ILO, and the World Bank, who are engaged in research on employment problems.

African Rural Employment Papers are distributed without charge to libraries, government officers and scholars.

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RESEARCH ON EMPLOYMENT IN THE RURAL NONFARM SECTOR IN AFRICA

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INTRODUCTION

The objectives of this paper are to summarize our existing knowledge of the rural nonfarm sector and to develop an analytical framework for examining the utilization of labor within this particular sector in Africa. Such an exercise is not without importance. African governments, for example, are increasingly recognizing the need for developing appropriate strategies and policies for generating rural employment.[1/] These strategies often include efforts to develop and expand employment opportunities in rural nonfarm activities. In analyzing these strategies, however, it is important to consider both the indirect effects of agricultural development policies on the rural nonfarm sector as well as the effects of policies, such as credit and manpower training, specifically directed to the promotion of rural industrialization and other rural nonfarm activities.

Unfortunately, both the analytical framework and the empirical data required to develop effective strategies and policies are lacking. In the conventional two sector development models of Lewis [1954], Fei and Ranis [1964], Harris and Todaro [1970], and Mellor and Lele [1972], for example, the rural nonfarm sector is not explicitly considered. Indeed, only recently have scholars such as Oshima [1971], Hymer and Resnick [1969], and Byerlee and Eicher [1972], pointed out the importance of including rural nonfarm activity as a separate and distinct sector for analytical purposes.

[1/] See, for example, the recent development plans of Kenya [1969], Uganda [1972], and Tanzania [1969] as well as the recent report of I.L.O. mission to Kenya [1972].

The analytical deficiencies with respect to the rural nonfarm sector are reinforced by the general lack of empirical data on this sector. In John de Wilde's [1971] excellent, "comprehensive" survey of African private enterprise, for example, only a few brief references are made to studies of nonfarm activities in rural areas. The present study is thus an attempt to fill these methodological and empirical lacunae and to demonstrate how this framework can be incorporated into proposed research on rural employment in Africa.

DESCRIPTIVE PROFILE OF THE RURAL NONFARM SECTOR

Although comprehensive data do not exist, an examination of available evidence reveals that there is extensive activity in the rural[2/] nonfarm sector. In rural Western Nigeria, for example, a recent I.L.O. study indicated that 27 percent of the employed males had their primary occupations in the rural nonfarm sector.[3/] A similar study undertaken in four

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[2/] The definitions of rural and urban areas vary widely from country to country. In Ghana, for example, the threshold population for an urban area is 5,000 inhabitants, while in Kenya and Nigeria the figures are 2,000 and 20,000 respectively [Rosser, 1973, p. 11]. For reasons of simplicity and comparability, however, the present study has adopted the standard definitions of urban and rural used by the United Nations. According to the United Nations, settlements with 20,000 or more inhabitants are defined as urban, while those with fewer than 20,000 inhabitants are defined as rural [United Nations, 1969]. Ideally, for the present study, a rural-urban classification scheme based on the occupational structure of the settlement would be most desirable with agriculturally-based settlements classified as rural and industrially or administratively based settlements classified as urban. This classification scheme would require more detailed information, however, on the value added or income earned by the various segments of these settlements. The 20,000 inhabitant dividing line adopted for this paper, however, should serve as a reasonable first approximation for the more desirable classification based on occupational structure.

[3/] Computed from Table 5.2 in I.L.O. [1970, p. 117].

villages in rural Uganda revealed that 20 percent of employed males were primarily engaged in nonfarm activities [Brandt, Schubert, and Gerken, 1972, p. 7].

If one includes the farmers who were also engaged in the nonfarm sector on a part-time basis, however, the magnitude of this sector becomes even more striking. In Western Nigeria, for example, 14 percent of the employed males in rural areas were farmers who were also secondarily engaged in nonfarm activities.[4/] Thus 41 percent of the employed males in rural Western Nigeria were engaged either entirely or part-time in nonfarm activities.[5/] Roughly parallel results have also been obtained in Northern Nigeria. In a survey of rural areas of Northern Nigeria's Sokoto Province, for example, H.A. Luning [1967, p. 77] presents data that reveal that 48 percent of the employed males had either primary or subsidiary occupations in the rural nonfarm sector.[6/] Remarkably similar results were obtained by David Norman in his excellent survey of three villages in Northern Nigeria's Zaria Province [1971, p. 10]; according to his data, 47 percent of the average male adult's working time in the major village, Dan Mahawayi, was spent on nonfarm occupations.

There are, however, large seasonal variations in rural nonfarm activity. Luning's study [1967, p. 77], for example, reveals that while 65 percent of the males in rural Sokoto Province were primarily engaged in nonfarm

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[4/] Computed from Table 5.2 in I.L.O. [1970, p. 117].

[5/] A remarkably similar result has been reported for the Paktia region of Afghanistan by Egbert Gerken [1973, p. 29]. His study reveals that 22 percent of the employed males were primarily engaged in rural nonfarm activities while an additional 15 percent were at least secondarily engaged in these activities.

[6/] Computed from data in Table 6, Luning [1967]. The data refer to wet season employment only.

activities during the dry season, only 6 percent were primarily engaged in these activities during the wet season, the period of peak demand for farm labor. Moreover, in his Zaria Province village survey, Norman presents data indicating that males devoted 79 percent of their time to nonfarm activities in February but only 27 percent of their time to such activities in August.[7/] Indeed, Norman's study reveals that during the periods of peak demand for farm labor, family male adults not only substituted family farm work for leisure, but also substituted family farm work for nonfarm employment. This fluidity of labor between a number of activities on a seasonal basis is a striking feature of rural Africa.

The available empirical evidence also indicates that the amount of nonfarm activity tends to vary with the population size of rural settlements. In rural Western Nigeria, for example, the I.L.O. survey [1970, p. 114] found that in villages with fewer than 500 inhabitants only 31 percent of the males engaged in nonfarm activities while in the villages with from 1,450-3,600 inhabitants, 73 percent of the males engaged in such activities. It should also be noted, however, that the I.L.O. survey [1970, p. 120] indicates that the occupational distribution of these villages and towns is importantly affected by their market or central place functions.

There are a large number of economic activities that fall within the purview of the rural nonfarm sector. Although there are many ways to categorize these activities, the employment focus of this study would suggest that an occupational classification scheme would be most appro-

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[7/] Computed from data in Table IV, Norman [1971, p. 16].

priate. The widely used International Labor Office's "International Standard Classification of Occupations," for example, subdivides the nonfarm occupations as follows: (1) professional, technical administrative; (2) sales workers (traders); (3) miners and quarrymen; (4) transport and communication workers; (5) craftsmen and production process workers ("industrial" workers); and (6) service workers [I.L.O., 1970, p. 275].

The most important occupational groups within the rural nonfarm sector in Tropical Africa are "sales workers" and "craftsmen and production process workers." Indeed, the available data indicate that together these groups account for over 70 percent of the employment in the rural nonfarm sector.[8/]

The fragmentary data also indicate that in the rural areas of Africa the number engaged in "industrial" activities may even exceed the number engaged in "trading." In rural Western Nigeria, for example, the I.L.O. survey indicates that 50 percent of the gainfully employed men and women in the nonfarm sector were "craftsmen and production process" workers while only 42 percent were "sales workers" [I.L.O., 1970, p. 117]. The "trading" and "industrial" activities in this particular area, however, were importantly differentiated by sex. Indeed, 88 percent of the "traders" were women, while 86 percent of "industrial" workers were men.[9/] This kind of differentiation of activity by sex, however, is not ubiquitous in Africa.

[8/] If only the main occupations of males are counted, "sales workers" and "craftsmen and production process workers" comprise 71 percent of rural nonfarm employment in Western Nigeria [I.L.O., 1970, Table 5.2], and 76 percent of dry season rural nonfarm employment in Northern Nigeria [Luning, 1967, Table 6].

[9/] These figures are also based on the main occupations of gainfully employed men and women; in addition, female food processors have been included within the agricultural sectors [I.L.O., 1970, p. 117].

In the U.A.R., for example, relatively few women are engaged in any kind of rural nonfarm activity.[10/] Moreover, in that country, 52 percent of the gainfully employed men and women in the rural nonfarm sector were "craftsmen and production process" workers while only 29 percent were classified as "sales workers" [U.A.R., 1966]. In view of the relative importance of the rural industrial sector in Africa, the remainder of this section will focus in more detail on this component of the rural nonfarm economy.[11/]

It is difficult to construct an accurate descriptive profile of the rural industrial sector, however, because data are generally not available. Although there have been surveys of small-scale industry in at least eleven countries in Tropical Africa, only a few included firms in the rural areas.[12/] Moreover, most of the surveys that did extend into

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[10/] Indeed, women account for less than 10 percent of nonfarm activities [U.A.R., 1966].

[11/] Moreover, it is not unlikely that the direct and indirect value added and employment multipliers would be higher for industrial than for trading activities. This is an empirical question, however, that should be investigated.

[12/] Surveys of small-scale industries have been undertaken in the following African countries: Cameroons, a 1964 government sample census undertaken in Western Cameroon [cited in de Wilde, 1971]; Democratic Republic of the Congo, a survey of Kinshasa [cited in de Wilde, 1971]; Ethiopia, a government survey of Addis and Asmara; Ghana, a 1963 government sample survey of the entire country [Ghana, 1965]; Ivory Coast, a 1967 government survey of Abidjan [de Wilde, 1971]; Kenya, a 1969 government survey of non-agricultural enterprises in rural areas [cited in I.L.O., 1972]; Nigeria, there have been surveys of: (a) 14 towns in Eastern Nigeria [Kilby, 1962], (b) Ibadan [Callaway, 1967] and [Koll, 1969], (c) 49 towns in Western and Mid-Western Nigeria by the Industrial Research Unit of the University of Ife [Lewis, 1972], (d) three towns in the Western State by the Western State government [Western State of Nigeria, 1970], (e) a 1964 sample survey of rural economic activity by the Federal Office of Statistics [cited in deWilde, 1971]; Senegal, a 1969 government survey of both rural and urban areas [cited in de Wilde, 1971]; Tanzania, a survey of 1700 firms in both rural and urban areas [Schadler, 1968]; Togo, a government census of Lome [cited in de Wilde, 1971]; Uganda, a 1970 trial survey by the government of small-scale industry [cited in de Wilde, 1971].

rural areas tended to focus on activities in the larger rural towns rather than on activities in the smaller villages. These limitations must be kept in mind in the following descriptive summary of rural industrial activity in Tropical Africa.

There is a surprising diversity of activities being undertaken in the rural industrial sector. The vast majority of these activities, however, involve the production or provision of goods and services for local markets. These activities are usually undertaken by artisans[13/] engaged in either manufacturing activity (involving the transformation of raw materials into finished products) such as leather-working, cloth-working, metal-working, wood-working and food processing, or service activities, such as electrical, automobile, bicycle and other repair activities, laundering, barbering, photography and printing. There is also, however, a smaller amount of rural activity centering around the processing of local raw materials for national and international markets; the milling of locally produced cereals and vegetable oil extraction are examples of such activities.

According to the available data, the composition of activities, undertaken by "industries" in both the rural and urban areas would appear to be quite similar throughout Africa. In terms of number of establishments, cloth-working is the most important activity, followed, in most cases, by wood-working. In rural Western Nigeria, for example, the I.L.O. survey of industries in the pilot area's rural towns reveals that 32 percent of the establishments were engaged in cloth-working (primarily tailoring) and

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13/ "Artisan industry" or "crafts" can be defined as manufacturing and technical servicing (installation, maintenance and repair) carried on by craftsmen working singly or with a few helpers or apprentices and without extensive division of labor. See Staley and Morse [1965, p. 6] or Schadler [1968, p. 41].

8 percent were engaged in wood-working (primarily carpentry), the area's second most important activity [I.L.O., 1970, pp. 187-188]. Similar results have been reported in the various surveys of urban small-scale industry. Cloth-working and wood-working, for example, account for 44 percent of the establishments in Ibadan [Callaway, 1967, p. 170], and 46 percent of the establishments in Oyo, Western Nigeria [Western State of Nigeria, 1970, p. 2].[14/] The other important activities are vehicle (bicycle and motor) repair, metal-working (primarily blacksmithing), shoemaking, and barbering.

The average size of these rural or urban artisanal industries, however, is quite small. In rural Western Nigeria, for example, I.L.O. survey data [I.L.O., 1970, p. 190] indicate that the "average" industrial firm employed only 2.6 workers, a figure that is inclusive of both proprietors and apprentices. Remarkably parallel results are reported in the surveys of artisanal industry in Eastern Nigeria and Ibadan, Nigeria.[15/] Indeed, in Eastern Nigeria 38 percent of the firms employed only one person and 54 percent employed from two to five persons.[16/]

The entrepreneurs or proprietors of these artisanal industries possess several general characteristics, some of which vary as between the rural

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[14/] Similar patterns have also been reported outside Africa. In a study of rural industry in Maharashtra State, India, M. C. Shetty reports that 41 percent of the establishments were engaged in cloth- or wood-working [Shetty, 1963, p. 61]. In Colombia, R. A. Berry found that 54 percent of the firms with fewer than five employees were engaged in cloth- and wood-working activities [Berry, 1972, p. 168].

[15/] Kilby [1962, p. 8] reports that the average firm in Eastern Nigeria employs 2.7 workers (inclusive of proprietors and apprentices) while Callaway [1967, p. 170], reports that the average artisanal firm in Ibadan employs 2.8 workers (inclusive of proprietors and apprentices).

[16/] In a sample survey of Ghanaian manufacturing enterprises, it is reported that 95 percent of the firms employ fewer than five persons [Ghana, 1965], while in Ife, Western Nigeria, it was reported that 85 percent of the firms employ fewer than five persons [Lewis, 1972, p. 432].

and urban sectors. The various sample surveys of African entrepreneurs, for example, reveal that the artisanal entrepreneurs tended to be younger than those engaged in other activities.[17] Ir rural Western Nigeria, for example, 40 percent of the farmers were over 45 years of age, while only 17 percent of the artisanal entrepreneurs had reached that age [I.L.O., 1970, p. 190].[18] Moreover, these surveys indicate these entrepreneurs had somewhat more formal education than the average adult male. In rural Western Nigeria, for example, 58 percent of the entrepreneurs had no formal education while the comparable figure for farmers was 72 percent [I.L.O., 1970, p. 191]. At the same time, however, the educational levels of the rural entrepreneurs were substantially below those of their urban counterparts. In Eastern Nigeria, for example, Kilby reports that only 19 percent of the urban entrepreneurs in his sample lacked any formal education [19] [Kilby, 1962, p. 15].

It is instructive to note, however, that virtually all these surveys of African entrepreneurship have concluded that there is virtually no correlation between education and business success.[20] Indeed, these

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[17] The major entrepreneurial surveys are Harris' study of 268 Nigerian entrepreneurs [Harris, 1970], Kilby's study of 160 "urban" entrepreneurs in Eastern Nigeria [1962], Callaway's study of 250 artisanal entrepreneurs in Ibadan [1967], Morris and Somerset's study of Kenyan businessmen [1971] and de Wilde's comprehensive survey of African private enterprise [1971].

[18] In Ibadan, Callaway reported that half the entrepreneurs were between the ages of 30 and 39 [Callaway, 1967, p. 160].

[19] Harris [1970, p. 309] found that only 13 percent had no formal education. The comparatively low percentage may be partly due to the fact that Harris' sample was composed of larger (the majority employed more than 20) firms than the others and that the entrepreneurs of larger firms generally have more education.

[20] See Morris and Somerset [1971, p. 215 for Kenya], Nafziger [1970], Kilby [1965, p. 92], and Harris [1970, p. 310] for Nigeria.

surveys generally conclude that business success depends more importantly on the entrepreneur's managerial and technical abilities rather than on his formal schooling.[21/] It would be instructive to ascertain if similar results were found in rural areas.

These studies also revealed that prior to the founding of their establishments, the urban entrepreneurs were generally traders, craftsmen, or engaged in white-collar occupations [de Wilde, 1971, p. 8]. It is particularly noteworthy, however, that although a great many of their fathers and grandfathers had been farmers, virtually none of the urban entrepreneurs in these surveys had been farmers prior to their firm's founding.[22/] Although data on the occupational background of rural entrepreneurs are not available, it does not seem likely this result would hold in the rural areas.

The labor used by the artisanal entrepreneur consists of both paid employees and apprentices; the majority of the laborers, however, are apprentices. In rural Western Nigeria, for example, 56 percent of those employed (inclusive of proprietors) in industries located in the rural towns were apprentices. The largest numbers of these were found in the newer artisanal industries such as in vehicle repair and in printing, wh le fewer were found in the older, more traditional artisanal enterprises. It should be noted that the apprenticeship system is the primary

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[21/] Virtually all surveys conclude that inadequate management, particularly inadequate financial management, is the major constraint on the development of African enterprises [de Wilde, 1971, p. 12].

[22/] In Harris' study, for example, only one of the 254 entrepreneurs had previously been a farmer. Indeed, Harris states that "agriculture has been less productive of entrepreneurship in Nigeria than has trade and craft activities." [Harris, 1967, Chapter 8]

vehicle for developing labor skills in this sector. Indeed, the apprenticeship lasts from one to seven years and usually involves a learning fee which may vary from £2 to £15 depending on the craft and the duration of the apprenticeship [I.L.O., 1970, p. 203]. The apprenticeship system operating in rural Western Nigeria is quite similar to that functioning in the urban areas of Nigeria.[23/]

The amount of physical capital used by artisanal industries, on the other hand, is quite small. Thirty-eight percent of the artisanal industries in rural Western Nigeria, for example, were housed in temporary workshops constructed of palm, raffia, or corrugated metal. The remaining workshops were primarily constructed of mud and almost none possessed cement floors [I.L.O., 1970, p. 192].[24/] Moreover, the use of machinery was minimal. Kilby reports, for example, that in Eastern Nigeria, 58 percent of the firms possessed no machines, 35 percent possessed one or more non-powered machines, and 7 percent possessed one or more power-driven machines [Kilby, 1962, p. 8]. Although similar data for the rural artisanal industries are not available, it does not seem likely that machines would be used extensively in the rural areas.

What is of interest from an economic point of view, however, is the efficiency with which these artisanal firms use these inputs. In this connection, estimates of the production functions or data on the average and marginal productivities of labor and capital as well as the capital-

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[23/] See, for example, Callaway's description of the apprentice system in Ibadan [Callaway, 1967, p. 161] and Kilby's description of the apprentice system in Eastern Nigeria [Kilby, 1962, p. 1].

[24/] In Eastern Nigeria, Kilby reports that 59 percent of the firms were housed in "temporary" workshops [Kilby, 1962, p. 8].

labor ratios and input prices would be of value. Unfortunately, virtually none of the surveys of African artisanal industries provide such information.[25/] The fragmentary evidence, however, reveals that the capital-labor ratio of these small-scale artisanal industries is substantially less than that of the larger firms. Kilby estimated that the capital-labor ratio of small-scale industry in Eastern Nigeria was quite small, about £100 per worker. He estimated that the ratio for the large-scale manufacturing firms, on the other hand, was 30 times larger [Kilby, 1962, p. 5]. These results thus would indicate that these smaller artisanal firms make intensive use of the apparent abundant factor, labor, and less use of the apparent scarce factor, capital.[26/]

Although the previous descriptive profile of rural industry has been presented from a static perspective, it is also important to examine the dynamics of the rural industrial sector. Many scholars have concluded that rural industry declines as development proceeds, a decline traceable to the assumed tendency for rural consumers to substitute imported or urban produced goods for goods produced in the rural areas. Stephen Resnick [1970], for example, has provided empirical evidence of the decline of

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[25/] One exception is my empirical study of production functions for Eastern Nigerian industry [Liedholm, 1966].

[26/] Similar results have been reported in various industrial surveys undertaken outside of Africa. Industrial surveys of Japan [Broadbridge, 1966, p. 61], India [India, 1968], and Pakistan [Ranis, 1962, p. 345], for example, reveal that the output-labor ratio increased with firm size, the output-capital ratio declines with firm size, and thus the capital-labor ratio increases with size. This variation in the capital-labor ratio might be traceable, at least in part, to factor price distortions that were systematically related to firm size. This result would hold, for example, if larger firms obtained capital at rates below equilibrium price and labor at rates above the equilibrium price; thus the labor-capital price ratio and firm size would be positively related.

rural industry during the period from 1870 to 1938 in Burma, Philippines and Thailand. Unfortunately, comprehensive data on rural industry were not available to Resnick, and thus his conclusions were based on fragments of evidence from diverse sources. Moreover, particularly in the case of Thailand, he presented evidence that indicated many rural industries survived and even flourished [Resnick, 1970, p. 61]. Thus, the results of Resnick's study, while impressive, cannot be considered conclusive. Additional evidence for the decline of rural industries, however, is provided in Montoya and Villalba's study of small-scale industry in Colombia [1969]. Their data indicate that between 1953 and 1964 the number of workers in rural industries declined from 120,656 to 101,754.

There are other studies, however, that provide a different perspective on the dynamics of the rural industrial sector. In India, for example, data from the National Sample Surveys [India, 1965] reveal that between 1953 and 1960 the number of persons engaged in rural manufacturing increased from 9.4 million to 12.9 million. Moreover, in three agricultural market areas in the Philippines, Arthur Gibb [1972, p. 8] reports that rural industrial employment increased at a rate of over 10 percent per year between 1966 and 1971. Finally, E. Gerken's study of rural Paktia, Afghanistan [1973, p. 30] reveals that employment in "crafts and trades" increased at a rate of 3.7 percent per year between 1964 and 1971.[27/] These various studies would thus indicate that the decline of rural industry cannot be assumed with certainty.

[27/] In Kenya, it is reported that wage employment in non-farm rural activities (which includes trading as well as industry) increased by 45 percent between 1967 and 1970 [I.L.O., 1972, p. 192].

The future size of the rural industrial sector, however, would depend importantly on the future growth of the agricultural sector. If new cash crops or technologies were introduced into the agricultural sector, for example, the increased agricultural production would create not only an indirect "income effect" that could increase the demand for rurally produced consumer goods, but also a direct "output effect" (associated with backward and forward agricultural linkages) that could increase the demand for rurally produced agricultural inputs and also provide opportunities for the local processing of agricultural outputs.[28/] It should be noted, however, that these same agricultural sector innovations might also raise significantly the opportunity cost of rural nonfarm labor. If the costs of rurally produced industrial goods were to increase, the competitive position of this sector with respect to imported or urban produced industrial goods would be weakened. Since the rural industrial and agricultural sectors are thus so closely linked to one another through both the product and factor markets, it is imperative that these two sectors be considered together in any dynamic analysis. Any research on the rural industrial sector thus must be built on an analytical framework that explicitly incorporates the complex relationships that exist between the agricultural and the rural industrial sectors.

[28/] A. Gibb has used the terms "income effect" and "output effect" in examining nonfarm employment changes in the Philippines [1971, p. 11].

THEORETICAL MODEL OF THE RURAL NONFARM SECTOR

The only theoretical model of an agrarian economy with nonagricultural activities is that developed by Stephen Hymer and Stephen Resnick [1969].[29] In this particular model, the set of alternatives facing the rural household is expanded to include not only agricultural production, but also nonagricultural, nonleisure activities. Hymer and Resnick consider that manufacturing, construction, service, and distribution activities undertaken either at home or in village establishments fall within the purview of their definition of nonagricultural activities. Indeed, these activities are given the purposely vague title of "Z" activities to indicate the heterogeneity of the group.[30] Since the Hymer-Resnick model highlights the interactions between the agricultural and nonagricultural sectors in rural areas, however, it can provide, if properly modified, a useful analytical framework for analyzing the dynamics of the rural nonfarm sector in Africa.

The basic features of the model are as follows. The rural sector can produce two goods, a "Z" good (Z) and an agricultural good (F), on the basis of its production possibility curve:

$$F = F(Z)$$

The "Z" good can only be produced and consumed within the rural sector; the F good, on the other hand, cannot be consumed within the rural sector but can only be exchanged for M, a manufactured good produced in the urban or foreign

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[29] Modifications and extensions of this basic model, however, have been set forth by Bautista [1971], Thirsk [1973] and Gerkin [1973].

[30] Subsequent authors have departed somewhat from Hymer and Resnick's definition of Z goods. Gerken [1973], Thirsk [1973], and Huddle and Ho [1972], for example, have restricted Z good activity to goods and services produced only in the home. For a more extensive discussion of the heterogeneous nature of Z good activity, see below, p. 23.

sector. The F and M goods are traded according to an exchange equation

$$M = PF$$

where P is the terms of trade between the food and the manufactured good. Finally, it is assumed that the rural sector possesses a set of indifference curves

$$U = U(Z,M)$$

and maximizes its utility subject to its production and exchange constraints. For the rural economy to be in equilibrium, the marginal rate of substitution in consumption of Z and M must be equal to the marginal rate of transformation of Z and F times the terms of trade between F and M.[31/]

This equilibrium condition can also be portrayed geometrically. The production possibilities between Z and F are portrayed in Figure 1.A. while the terms of trade between Z and M are shown in Figure 1.B. The consumption possibilities between Z and M (Figure 1.C.) are then obtained by combining terms of trade and production possibilities relationships. The equilibrium position then occurs at the point of tangency (C_1) between the consumption possibilities curve and the consumers indifference curve of Z for M.

[31/] If one differentiates the Lagrangian expression $U(Z,M) + \lambda(M - P[F(Z)])$ with respect to each of the variables, one obtains the following set of first order conditions:

$$(1)\quad U_Z - \lambda PF_Z = 0$$

$$(2)\quad U_M + \lambda = 0$$

$$(3)\quad M - P[F(Z)] = 0.$$

Equations one and two can be rewritten as the equilibrium tangency condition:

$$\frac{U_Z}{U_M} = -PF_Z$$

or

$$MRS_{ZM} = P.MRT_{ZF}$$

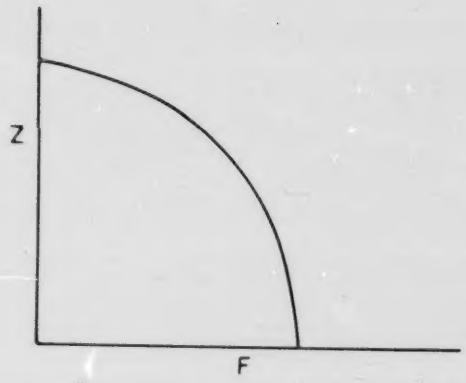

Figure 1.A. Production Possibilities Curve for Z and F

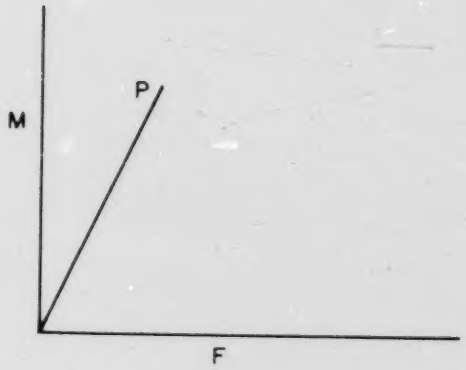

Figure 1.B. Terms of Trade Between M and F

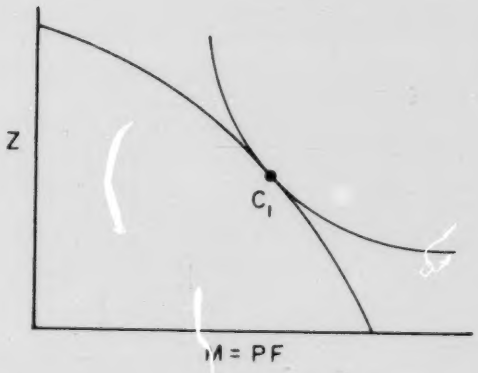

Figure 1.C. Consumption Possibilities Between Z and M

This framework can then be used to demonstrate what relationships must be examined when technological change is introduced into the analysis. If a technological change is introduced into the agricultural sector (F), for example, this will affect not only the F sector, but the Z sector as well. Such a change is portrayed in Figure 2. The technological change in agriculture would most likely cause the production possibility curve to twist outward from I to II (Figure 2.A.). If one assumed that the terms of trade initially were not affected, then the consumption possibilities curve would also shift from I to II. A new equilibrium for Z and M goods, C_2, would then occur at the point of tangency between the new consumption possibility curve and the relevant consumers indifference curve (Figure 2.C.).

Whether the new equilibrium point involves more, the same, or less Z goods, however, will depend on the relative strength of two effects, the "income" and "substitution" effects. The technological change and expanded food production cause F goods to become cheaper relative to Z goods. If the terms of trade between F and M goods are assumed to be constant, M goods would also become cheaper relative to Z goods, which would encourage consumers to substitute M for Z in consumption. In Figure 2.C., this "substitution" effect is shown in the movement from C_1 to A.[32/] At the same time, however, the increased production of F goods (with terms of trade fixed) yields an increase of income to the rural household, and this increased income might be partly spent on additional Z goods. The final result of the "income effect" will depend on whether Z goods are "inferior" goods (in which case less Z is consumed at higher income) or "normal" goods (in which case more Z is consumed at higher incomes). In

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[32/] In Figure 2.C., the income and substitution effects are shown using the Slutsky approach of analyzing a rotation of the budget line as price is changed and money income is held constant in the sense that consumers can purchase only the initial basket of goods (C_1).

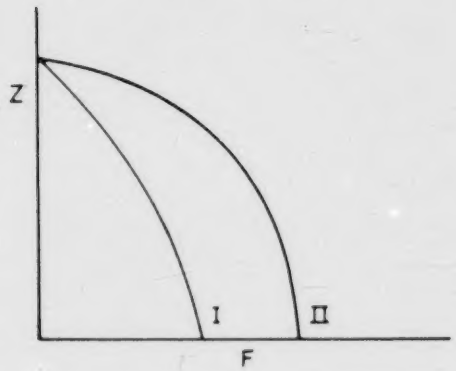

Figure 2.A. Production Possibilities Curve for Z and F

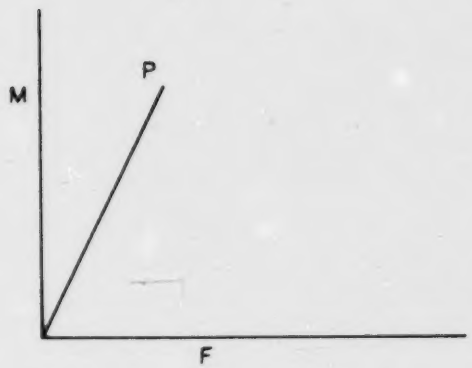

Figure 2.B. Terms of Trade Between M and F

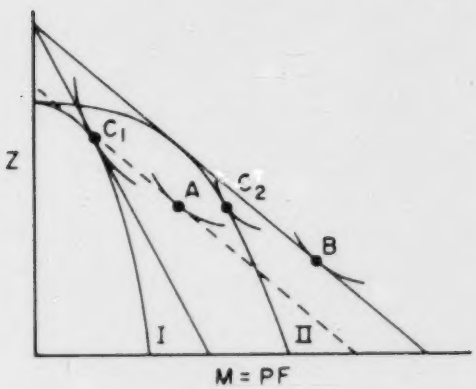

Figure 2.C. Consumption Possibilities Between Z and M

Figure 2.C., the "income effect" is shown in the movement from A to B.[33/] Since less Z is produced and consumed at B than at A, the Z good in this example would be an "inferior" good. The income effect would simply reinforce the substitution effect and result in a new equilibrium position in which less Z would be produced and consumed than before. If, however, the Z good were strongly "normal," the positive "income" effect might be large enough to offset the "substitution" effect and thus result in a new equilibrium position in which more Z goods were consumed and produced than before.

The analysis can also be modified to incorporate changes that might occur in the terms of trade between Z and F goods. If, for example, the technological change in agriculture results in a decline in the price of F relative to M goods, this would result in an inward shift in the consumption possibility curve. Indeed, it could partially or even completely offset the outward shift in the consumption possibility curve caused by the technological change.

Finally, the same analytical framework can be used to examine the effect of a change in Z good technology on the production and consumption of Z goods in the rural area. Such a change would most likely result in an outward shift of the existing production possibilities curve biased toward Z. If one assumes that the terms of trade between F and M remain constant, Z goods would now become cheaper relative to M goods, which would encourage consumers to substitute Z for M in consumption. Moreover, unless Z goods were "inferior," the rise in rural income would also act to increase further the demand for Z goods. Once again, however, the resulting change in the consumption and

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[33/] The final movement from B to C_2 is due to the curvature effect that occurs because the production possibilities curve is not linear. As Hymer and Resnick point out, however, the curvature effect can act to offset partially the income and substitution effect, but it cannot fully outweigh the net result of the two effects in terms of the final amount of Z goods produced [Hymer and Resnick, 1969, p. 497].

production of Z goods would depend on the relative strength of the income and substitution effects.

The previous discussion thus reveals that the future role of Z goods depends importantly on the strength and direction of income elasticities of demand for these goods. Indeed, Hymer and Resnick suggest that Z activities are "inferior" and on this basis they conclude that the production and consumption of Z goods will decline. The two authors do not present, however, any empirical evidence to support their view.

If one examines the various consumer budget studies that have been undertaken in Africa, however, the evidence does not support the contention that Z goods are generally inferior. There have been, for example, four African rural consumer surveys which have provided estimated income or expenditure elasticities for nonfood items: Massell and Parnes' survey in rural Uganda [1969], Massell's survey in rural Kenya [1969], Hay's survey in rural Nigeria [1966] and Leurquin's survey in rural Ruanda-Urundi [1960]. In all the surveys, the income elasticities for nonfood items, which were usually only broken down into the broad categories of services, clothing, and durables, were all positive and in most cases even exceeded one. When comparing the different surveys, for example, the elasticity for services varied from 1.1 to 1.7, the elasticity for clothing from .9 to 1.4, and the elasticity for durables from 1 to 1.5.

It could be argued, however, that some of the clothing and durable goods consumed by the rural households were not produced locally, but were imported from either the urban area or abroad; thus the income elasticity estimates for these categories might not provide an accurate reflection of the income elasticities of Z goods. Unfortunately, only Leurquin [1960, p. 313] provides estimates of the income elasticities of both locally produced and imported

goods. He discovered, however, that the income elasticity for locally produced durable goods was positive, .6, but less than the income elasticity for imported durable goods, 1.2. Thus, the limited empirical evidence for rural Africa would indicate that Z goods may not be "inferior" and that the demand for these goods may increase along with the growth in rural income. It is clear from this review, however, that a necessary component of any analysis of the rural industrial sector is a study of the rural houeholds' income elasticities.

The Hymer-Resnick model, however, also indicates that the ability of the rural economy to adjust to the new demand for Z goods would depend importantly on how well the rural economy was able to reallocate its resources along its existing production possibilities curve. For this purpose, it would be useful to have an empirical estimate of the rural economy's production possibilities between Z and F. One approach would be to use a linear programming or activity analysis framework to determine the production possibilities curve. Alternatively, however, the production possibilities curve could be constructed from estimates of the parameters of the Z and F goods' production functions and from data on the total quantity of inputs in the rural areas. By artibrarily allocating the total quantity of rural inputs to the two productive activities, Z and F, in varying proportions, one could then obtain, using the production functions for these two activities, estimates of the output combinations that make up the production possibilities curve. In a static framework where technology and total input quantities were fixed, the resulting estimates of the production possibilities could thus be used to determine how easily the rural economy would be able to reallocate its existing resources between Z and F activities in response to a change in the relative demands for these goods.

Once the existing production functions and production possibility curves were constructed one could then introduce technical change into the analysis. The task could be accomplished, for example, by incorporating technological change explicitly into the various estimated production functions for F and Z activities. Included within the purview of the analysis would be not only embodied technical change, such as the introduction of powered machinery or tools in the case of Z activities, but also disembodied technological change, such as improved or expanded entrepreneurial skills and organization. The resulting outward shift of the production possibility curve due to these innovations could then be computed and used in determining the new quantity of Z goods produced as well as the employment generated by these activities.

Although the Hymer-Resnick model provides a useful starting point for analyzing the rural nonfarm sector, several modifications are required if it is to serve as the basis for empirical research on this sector. These modifications involve both a disaggregation of the Z good concept as well as an extension of the basic theoretical model.

The Z good concept is too general to capture and reflect adequately the diverse nature of productive activity undertaken in the rural nonfarm sector. For analytical purposes, it would perhaps be fruitful to classify Z good activity by the degree of specialization and market involvement. Three general categories of rural nonfarm activities might then be specified:

(a) non-traded home production for own use;

(b) traded production undertaken as a secondary occupation;

(c) traded production undertaken as a primary occupation.

The nontraded, home produced goods and services, for example, are likely to be "inferior" and thus would be generally expected to decline as rural incomes

increase.[34] The Z goods and services that are marketed, but produced by farmers on a part-time basis only might be expected to face a slightly higher income elasticity of demand. The lack of specialization in these activities, however, makes them rather vulnerable to imported or urban-produced goods. The Z goods and services produced by full-time specialists, on the other hand, stand the best chance of competing effectively against these "outside" goods. Indeed, many of these activities, the majority of which are undertaken in separate village or town workshops, possess high income elasticities and should be expected to serve as focal points for expanded employment opportunities in rural areas.[35] The differing characteristics and potentialities of the various types of rural nonfarm activities would thus indicate that some kind of disaggregation of the Z good concept would be warranted.

On the theoretical level, a modification of the Hymer-Resnick model would also appear to be necessary. Essentially, this particular model focuses only on the demand for nonfarm activity that is generated by "farm income" (i.e., "income effect"); thus, it does not incorporate all the sources of potential demand for rural nonfarm activity.

One important source of potential demand for rural nonfarm activities omitted for the Hymer-Resnick model, for example, is that provided by the urban or foreign sectors. Huddle and Ho [1972] have pointed out that the

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[34] See Staley and Morse [1965], Chapter 4, for a discussion of this point. In a dynamic framework, one might expect a progression over time from "a" activities to "b" activities to "c" activities.

[35] See, for example, Huddle and Ho [1972] for a discussion and empirical evidence of the high income elasticities associated with these types of rurally-produced goods. Gerken [1973] has also found a high correlation between the growth of employment and the degree of specialization in production (a variable he calls "occupationalization") in a rural area in Afghanistan. Baking and motor repair activities were cited as examples of rural activities that were highly specialized (i.e., few part-time entrepreneurs) and also experienced rapid employment growth.

international demand for rurally-produced traditional and cultural goods is quite high. Indeed, their study reveals that the income elasticity of demand for a broad group of eighty-one culturally oriented products in the U. S. and O.E.C.D. countries significantly exceeded one.[36/] Clearly, this source of potential demand for rural nonfarm goods must not be overlooked in any research dealing with this sector.

The other sources of demand for rural nonfarm activities not explicitly included in the Hymer-Resnick model are those arising as the result of direct backward and forward linkages with the agricultural sector ("output effects"). Several scholars, for example, have recently stressed the importance of focusing on the backward linkages from the agricultural to the industrial sector.[37/] They point out that an increase in agricultural production will likely generate an increased demand for various kinds of purchased manufactured farm inputs. Not all of these manufactured inputs, however, are produced in urban areas or are imported. Indeed, several kinds of farm inputs, such as small plows and tubewells, are currently being produced and serviced in small rural workshops.[38/] Thus, any research on the rural nonfarm sector must recognize that the Z good concept cannot be restricted only to consumer goods, but must be expanded to include intermediate goods as well.[39/]

[36/] The products examined in their study include such items as wood carvings, earthenware, handknitted goods, brassware, and headwear (Huddle and Ho [1972], pp. 3-8).

[37/] See, for example, Johnston and Cownie [1969], Kaneda and Child [1971], Falcon [1967] and Johnston and Kilby [1972].

[38/] See Falcon [1967] and Kaneda and Child [1971] for a discussion of tubewell manufacturing in Pakistan.

[39/] Bautista [1971] has developed a theoretical model in which Z goods can be either consumed or used as intermediate capital goods for the production of agricultural goods.

In addition to being directly affected by the backward linkages from the agricultural sector, the rural nonfarm sector is also directly influenced by forward linkages from that sector. The indigenous processing of agricultural output, for example, is an important activity even at the early stages of development and much of this activity is carried out in the rural areas.[40/] The output and employment generated by this processing activity, as with the input industries, is directly governed by the amount of agricultural production in the area. An input-output framework would be of use in analyzing that portion of rural nonfarm activity directly arising from either backward and forward linakges with the agricultural sector. If these various modifications are introduced into the Hymer-Resnick model, it can become an even more useful foundation on which to build a research study focusing on employment in the rural nonfarm sector.

[40/] See, for example, Falcon [1967] and Timmer [1972].

AN APPROACH TO RESEARCH ON RURAL NONFARM EMPLOYMENT IN SIERRA LEONE

The modified analytical model previously outlined will provide the basic framework for a series of research studies focusing on employment in the rural nonfarm sectors of several African countries.[41/] The following section will focus on how research on the rural nonfarm sector will be undertaken in one of these countries, Sierra Leone.[42/]

In Sierra Leone, as in most other African countries, the data required for a study of rural nonfarm employment do not exist.[43/] Thus, the first task of the project will be to undertake a series of surveys for the purpose of generating the required statistics.

Indeed, the largest component of a research project on rural nonfarm employment will be the surveys of the rural nonfarm activities themselves. These surveys will be centered around the nonfarm firm unit and will be primarily designed to elicit detailed information on the firms' inputs and outputs; these data would then serve as the basis for examining the supply of rural nonfarm goods and services.

It is envisioned that in Sierra Leone the nonfarm firm surveys will be carried out in two stages. In the first stage, it will be necessary to obtain an estimate of the total population of rural nonfarm establishments in

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41/ In each country, the rural nonfarm study will be integrated with farm level production, marketing and migration studies. The overall study will provide a model of the rural sector of each economy built up from the micro level, a model that can be used for analyzing rural employment problems. See Byerlee and Eicher [1972] for a more complete description of the entire analytical framework.

42/ For a description of a similar study to be undertaken in Nigeria, see Olayide [1972].

43/ See above, p. 6, for a discussion concerning the paucity of data on the rural nonfarm sector in Africa.

Sierra Leone. This initial survey is required because no data currently exist on the total number of rural nonfarm firms in that country.[44/] Given budgetary and time limitations, however, it will not be possible to undertake a complete enumeration of these firms in Sierra Leone. Thus, an estimate of the nonfarm "establishments" population must be obtained using some form of stratified sampling procedure. Since the empirical evidence indicates that the amount of nonfarm activity tends to vary with the size of rural settlements, it would appear to be most useful to stratify on the basis of the size of localities.[45/]

The smallest settlement units to be sampled in Sierra Leone will be the "enumeration areas."[46/] To ensure consistency with the studies of farm production and migration that will be undertaken simultaneously in Sierra Leone, the sample of "enumeration areas" selected for these particular studies will be included in the nonfarm enterprise sample as well. All the nonfarm establishments that engage in manufacturing (including servicing) or retailing in these selected "enumeration areas" will be counted as will all those establishments found in a randomly selected sample of approximately 5 percent of the other "enumeration areas."

In addition to those "enumeration areas," however, it will be necessary to obtain an estimate of the population of nonfarm establishments in the

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[44/] There are statistics, for example, only for those "manufacturing" firms employing more than six persons. Data on the occupations of the working population in 1963, however, are presented in Volume 3 of the Population Census [Sierra Leone, 1965].

[45/] For a discussion of the variation of activity by settlement size, see above, page 4.

[46/] Each "enumeration area," which is a division constructed by the Central Statistics Office for the 1963 population census, contains an estimated 200 farm families [Spencer, 1972, p. 8].

larger "rural"[47/] localities, particularly those market towns (or central places) that service the previously selected "enumeration areas." A sample of these localities, stratified by population size, will be selected for complete establishment enumeration. It is evisaged that perhaps 5 percent of the 312 localities with populations from 500 to 1,000, 10 percent of the 148 localities with populations from 1,000 to 5,000, and 50 percent of the 16 localities with populations from 5,000 to 20,000 will be surveyed [Sierra Leone, 1965, p. 39]. Finally, to ensure that the rural-urban links are fully traced, the nonfarm establishments in Sierra Leone's two "urban" areas, Bo and Freetown, will also be completely enumerated.

In each of these first stage surveys of the nonfarm firms, enumerators will be expected to record the following information about each establishment:

(a) the type of activity,

(b) the number of workers, including the proprietor, hired workers and apprentices,

(c) the type of workshop (whether temporary, mud or cement),

(d) the number of machines used.

These data would provide an overall picture of the estimated population of firms in the rural nonfarm sector.

In the second stage of the nonfarm firm analysis, however, it will be necessary to draw a stratified sample of firms from this estimated population for the purpose of conducting more detailed surveys. In particular, enumerators will be sent to selected firms on a fortnightly to monthly basis, to obtain information on:

[47/] The term "rural area" has been previously defined to include those areas with a population fewer than 20,000. See above, page 2.

(a) the value and quantity of output,

(b) the value and quantity of inputs broken down by type and source (whether obtained from rural or nonrural areas),

(c) the value and quantity of capital assets, including inventory.

These data will be used to estimate the (a_{ij}) parameters required for the activity and input-output portions of the study as well as for estimating the parameters of the production functions of the rural establishments. In view of the seasonal variation of rural nonfarm activity, it is further envisioned that alternative estimates of these parameters will be computed on a seasonal basis.[48/]

In these same detailed surveys, however, data on the characteristics of the entrepreneur will also be collected. In particular, information on the age, education, ethnic origin, home areas, previous occupation, father's occupation, sources of initial and present capital, perceived barriers to expansion, and business organization will be obtained. These data will be useful in determining the elasticity of supply of rural entrepreneurship. In addition, they should provide insights into the constraints faced by rural entrepreneurs and how these might be ameliorated by policy action.

In addition to these surveys that focus on the nonfarm decision units, however, the previously described analytical model would suggest that detailed surveys of the farm or household decision units are also required. The input and output data for the farm sector, for example, are needed in order to obtain estimates of the production possibilities curve between farm and nonfarm activities. Moreover, the farm level surveys must generate the data on those individuals in the farming household that engage at least

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[48/] Erik Thorbecke [1973] has recently stressed the importance of obtaining seasonal estimates of these coefficients.

part-time in rural nonfarm endeavors. These data on the farmers' allocation of time between leisure, farm, and nonfarm activities, particularly on a seasonal basis, are important for obtaining estimates of the supply elasticity of nonfarm labor. Fortunately, all of these required data will be generated by a series of farm production surveys that will be undertaken in the same "enumeration areas" as the nonfarm surveys.[49/]

The final component of this research project on rural nonfarm employment is the survey of household income and expenditure patterns to be undertaken in these same "enumeration areas" of rural Sierra Leone. The expenditure and income data collected will be used to estimate the income elasticities of various rural income groups for rural nonfarm activities. These surveys must thus depart from the traditional budget studies that focus only on food purchases; rather, they must be designed to obtain very detailed breakdown of the households' purchases of individual nonfood items. Moreover, since one is interested in the demand for rurally produced goods, it will be important to determine whether the purchased goods were produced locally or imported from outside the rural area. Finally, since the purchases of some items, particularly durable goods, will be made infrequently and will vary on a seasonal basis, it is imperative that the surveys be conducted for a period of at least one year. The households, however, will not need to be interviewed any more frequently than fortnightly. Although these types of budget

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[49/] See Spencer [1972] for a more complete description of the farm production surveys.

surveys have rarely been undertaken, they are of critical importance for determining the demand for rural nonfarm activities.[50/]

The data generated by these surveys of rural nonfarm firms, farm production, and rural household expenditure patterns will enable one not only to compile a descriptive profile of Sierra Leone's rural nonfarm sector, but also to determine the key structural parameters of that sector and the intersectoral linkages that unite it with the other parts of the economy. Once these key relationships have been determined, it will then be possible to trace the employment effects of activities and policies undertaken both within the outside and rural nonfarm sector.

[50/] Indeed, they only need to be supplemented by a survey of the potential urban and foreign demands for such activities. It should be further noted that conventional household expenditure surveys of Sierra Leone have been carried out in 1951 (for Freetown) [Sierra Leone, 1955], and in 1968 (Western Area) [Sierra Leone, 1968]. D. W. Snyder [1971] has examined the 1968 data using a linear probability analysis of household consumption and savings behavior, but has not generated expenditure elasticities for any rural nonfarm activities.

SUMMARY

Empirical evidence has been assembled in this paper to show that the rural nonfarm sector is an important source of income and employment in rural areas of Africa. Although it is clear that the rural nonfarm sector will have to be considered in any long-run solution of the employment problem, very little systematic research has been undertaken to analyze the dynamics of this sector. The Hymer-Resnick model was introduced as a useful framework for focusing research efforts on the rural nonfarm sector. Several modifications were then proposed for empirically applying this model. These included: (a) relaxing the assumption that output of the rural nonfarm sector cannot be traded to urban areas and abroad and (b) considering the effects of the backward and forward linkages of agriculture on the growth of the rural nonfarm sector.

The paper concluded with a description of several surveys required to generate the micro-data for the detailed analysis of this sector. It was suggested that emphasis be given to: (a) measuring the income elasticities of demand for rural nonfarm goods and services by income class, (b) exploring the production possibilities curve between farm and nonfarm activities given the rural factor endowment and (c) analyzing the impact of agricultural development policies on output and employment in the rural nonfarm sector. The results of this analysis should prove to be useful not only to scholars, but to those charged with formulating policies for dealing with problems of rural employment and development in Africa.

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